Amendments to the Specification

On page 1, replace the paragraph starting at line 18 with the following amended paragraph:

In general, a scheduling algorithm is a predetermined exposure sequence based on the material sensitivity and dynamics that dictates how long each hologram should be exposed during the recording process so that every hologram within the same location has equal diffraction efficiency upon readout. The recording process includes simultaneous illumination of a location in a holographic medium by a data beam and a reference beam. A probe beam that is nominally a duplicate of the reference beam that was used for the recording can be used at any time to read the hologram and measure the efficiency of the recording. However, the process of reading the hologram with the probe beam further exposes the material and therefore decreases the sensitivity of the material similarly as in the recording process. Separately using a probe beam in this way therefore decreases the number of holograms that can be written in the corresponding location, which is an undesirable effect.

On page 8, replace the paragraph starting at line 3 with the following amended paragraph:

The present invention enables real-time exposure scheduling while recording a hologram. This is especially useful if, for example, the hologram has been exposed to ~~read-out~~ read-out beams before the entire stack of holograms has been written and therefore sequential ~~write-hologram~~ write-hologram locations might have significant variations in recording dynamics. Measurements taken at the detector 18 can be used as feedback for dynamically adjusting the amount of exposure necessary to achieve the desired diffraction efficiency of the current hologram being recorded in the holographic medium 8. The diffracted ~~probe~~ reference-beam power (assuming it is aligned correctly) is proportional to the diffraction efficiency of the recorded hologram since it is directly reading the grating as it is built up. As the hologram is recorded, the diffraction efficiency increases according to some predetermined material-dependent scaling relationship. Once the recorded hologram diffracts the desired amount of power, the recording can be stopped. This could replace the need for the system to follow a predetermined exposure schedule since the exposure is dynamically altered on an "as needed" basis. For example, for a nominal value of P_{input}, $= 10^{-1}$ W, an initial reading at the detector 18

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may give a value of $P_{diffracted} = 10^{-5}$ W, which corresponds to diffraction efficiency of $e = 10^{-4}$ (0.01%). The recording may be stopped for example when the diffraction efficiency reaches a threshold value of $e = 10^{-3}$ (0.1%).In this way, estimating the diffraction efficiency e allows one to monitor and manage the dynamic range of the holographic medium 8.

On page 8, replace the paragraph starting at line 23 with the following amended paragraph:

The present invention enables vibration detection while recording a hologram. The ~~probe~~ <u>reference</u> beam can be used to detect sudden changes in diffracted power due to a misalignment caused by vibration. Any movement in the system that causes significant misalignment will alter the amount of power that is diffracted from the reference beam horizontal component into the data path. This will appear as fluctuations at the detector that can be monitored and used to determine the hologram integrity. This can also be used in to monitor vibration during the read mode of the device so that the system can have some rough determination of whether the vibration is affecting data integrity.

On page 9, replace the paragraph starting at line 4 with the following amended paragraph:

When reading a hologram that has been recorded at a set diffraction efficiency, the present invention enables fine-tuned control as well as diagnostic monitoring. Under these circumstance only the reference beam 6 <u>(which is also denoted at the probe beam when reading holograms)</u> is turned on Then in Figure 1 the input arm 6a of the reference path is active since the reference beam 6 is on, but the input arm 4a of the data path is not active. On the output side, the output arm 4b of the data path is active because the hologram recorded in the holographic medium 8 diffracts the reference beam 6, but the output arm ~~6a~~ <u>6b</u> of the reference path is not active. Then diffraction efficiency e can be characterized as above in terms of a diffracted power $P_{diffracted}$, which ~~is~~ <u>can be</u> measured <u>or characterized</u> at the detector, <u>and</u> an input power P_{input}, which ~~is~~ <u>can be</u> measured from <u>or characterized by</u> the reference beam 6 (or its source).

On page 9, replace the paragraph starting at line 23 with the following amended paragraph:

The present invention enables fine servo positioning (e.g., locking onto the hologram and/or stack) while reading a hologram. Once a hologram has be written into the material at a set diffraction efficiency, diffracted power resulting from the reference beam horizontal polarization component ~~off of~~ and this hologram can be used as a metric by which misalignments can be measured. A very fine positional and/or angular alignment of the reference beam to the hologram can be achieved by servo-feedback from the detector 18 in Figure 1 to the fine positioning device ~~such~~ so that the position of maximum diffracted power can be found. The image detector can then be read out ~~assuring~~ with some assurance that the maximum signal has been obtained.